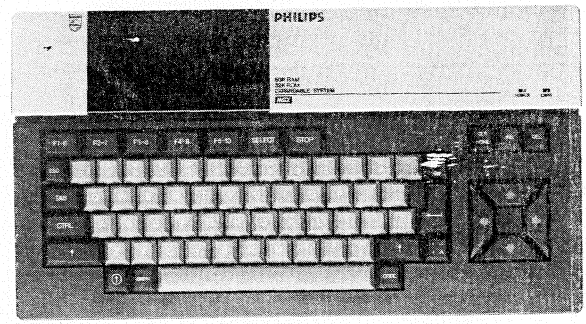
Service
Service
Service



37 800 A

Service Manual

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

See also:
REPAIR METHOD VG8020

(GB) SPECIFICATION

Micro processor	: Z80A
Memory	: 32k ROM 16k video RAM 64k user RAM
Video display processor	: TMS9929A
Sound processor	: YM2149
Interfaces	: RF output - 75 Ω (UHF channel E36) Monitor output Audio cassette recorder 2 joysticks 2 cartridge slots
Keyboard	: 73 keys QWERTY
Power supply voltage	: 220 V± 10%, 50 Hz

(NL) SPECIFICATIE

Micro processor	: Z80A
Geheugen	: 32k ROM 16k video RAM 64k gebruikers RAM
Video display processor	: TMS9929A
Geluidsprocessor	: YM2149
Interfaces	: RF uitgang - 75 Ω (UHF kanaal E36) Monitor uitgang Audio cassette recorder 2 handbedieningen 2 cartridge sleuven
Toetsenbord	: 73 toetsen QWERTY
Voedingsspanning	: 220 V± 10%, 50 Hz

(F) CARACTERISTIQUES TECHNIQUES

Micro processeur	: Z80A
Mémoire	: 32k ROM 16k RAM vidéo 64k RAM utilisateur
Processeur vidéo	: TMS9929A
Processeur son	: YM2149
Interfaces	: Sortie RF - 75 Ω (Canal UHF E36) Sortie moniteur Audio cassette 2 poignées 2 "slots" cartouche
Clavier	: 73 touches QWERTY
Tension d'alimentation	: 220 V± 10%, 50 Hz

(D) TECHNISCHE DATEN

Micro Prozessor	: Z80A
Speicher	: 32k ROM 16k video RAM 64k Gebrauchers-RAM
Video Prozessor	: TMS9929A
Tone Prozessor	: YM2149
Schnittstellen	: RF Ausgang - 75 Ω (UHF-Kanal E36) Monitor Ausgang Audio Kassette Recorder 2 Handbedienungen 2 Kassettenschlitze
Tastatur	: 73 Tasten QWERTY
Versorgungsspannung	: 220 V± 10%, 50 Hz

(I) DATA TECNICI

Microprocessore	: Z80A
Memoria	: 32k ROM 16k RAM vidéo 64k RAM utilizzatori
Processore display video	: TMS9929A
Processore suono	: YM2149
Interfaccie	: Uscita RF - 75 Ω (Canale UHF E36) Uscita monitore Registratore audio a cassetta 2 leve manuali 2 scanelature per cartuccia
Tastiera	: 73 tasti QWERTY
Tensione di alimentazione	: 220 V± 10%, 50 Hz

Documentation Technique Service Dokumentation Documentazione di Servizio Huolte-Ohje Manual de Servicio Manual de Serviço

Subject to modification

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Service Consumer Electronics

(GB) WARNING

The cassettes should be exchanged with the set switched off.

Adjustments

VDP clock frequency

— Connect via a 10:1 probe a frequency meter to 37U30.
— Adjust TC1 for a frequency of 445.32 kHz.

Power supply voltage

— Adjust on the supply PCB VR1 for a voltage of 5 V across the output (C3).

(NL) WAARSCHUWING

Het uitwisselen van cartridges dient plaats te vinden bij een uitgeschakeld apparaat.

Instellingen

VDP klokfrequentie

— Sluit via een 10:1 probe een frequentiemeter aan op 37U30.
— Regel TC1 af op een frequentie van 445,32 kHz.

Voedingsspanning

— Stel op het voedingsspanningspaneel VR1 in op een spanning van 5 V over de uitgang (C3).

(F) ATTENTION

Le remplacement de cartouches doit avoir lieu lorsque l'appareil est hors service.

Réglages

Fréquence d'horloge VDP

— A travers une sonde 10:1, brancher un fréquencemètre sur 37U30.
— Ajuster TC1 à une fréquence de 445,32 kHz.

Tension d'alimentation

— Sur la platine de tension d'alimentation, ajuster pour une tension de 5 V sur la sortie (C3).

(D) WARNUNG

Cassetten müssen bei ausgeschaltetem Gerät ausgewechselt werden.

Einstellungen

VDP-Taktfrequenz

— Über einen Taster 10:1 einen Frequenzmesser an 37U30 schalten.
— TC1 auf eine Frequenz von 445,32 kHz einstellen.

Versorgungsspannung

— An der Versorgungsspannungsplatte VR1 auf eine Spannung von 5 V an dem Ausgang (C3) einstellen.

(D) AVVERTIMENTO

La sostituzione delle cartuccie deve farsi quando l'apparecchio è fuori servizio.

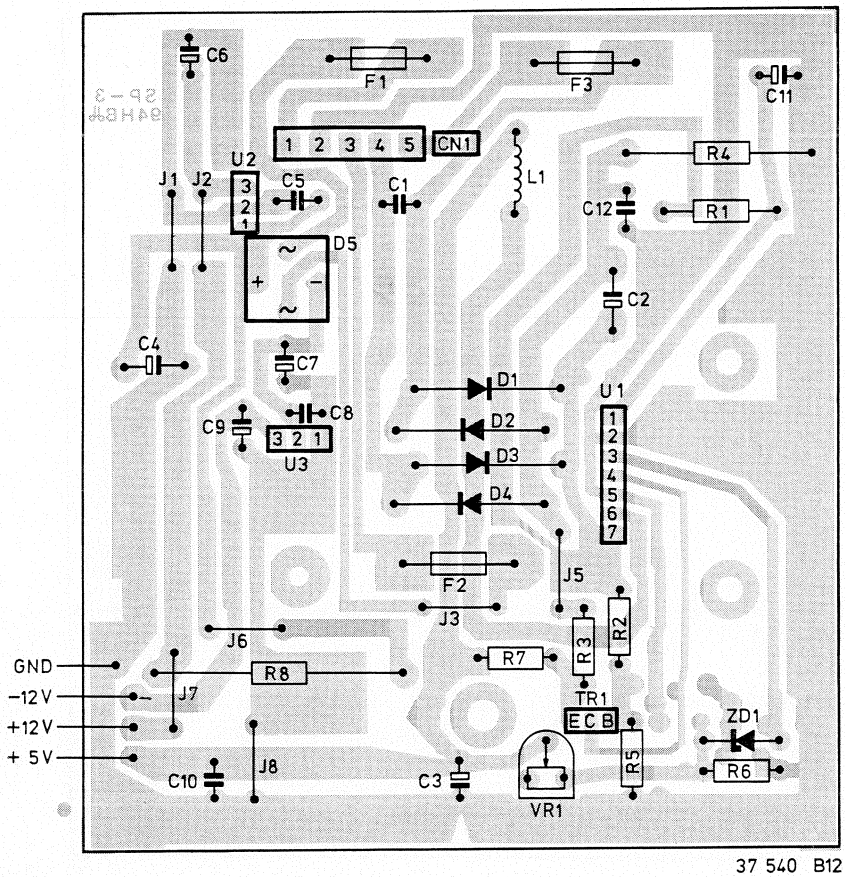
Regolazioni

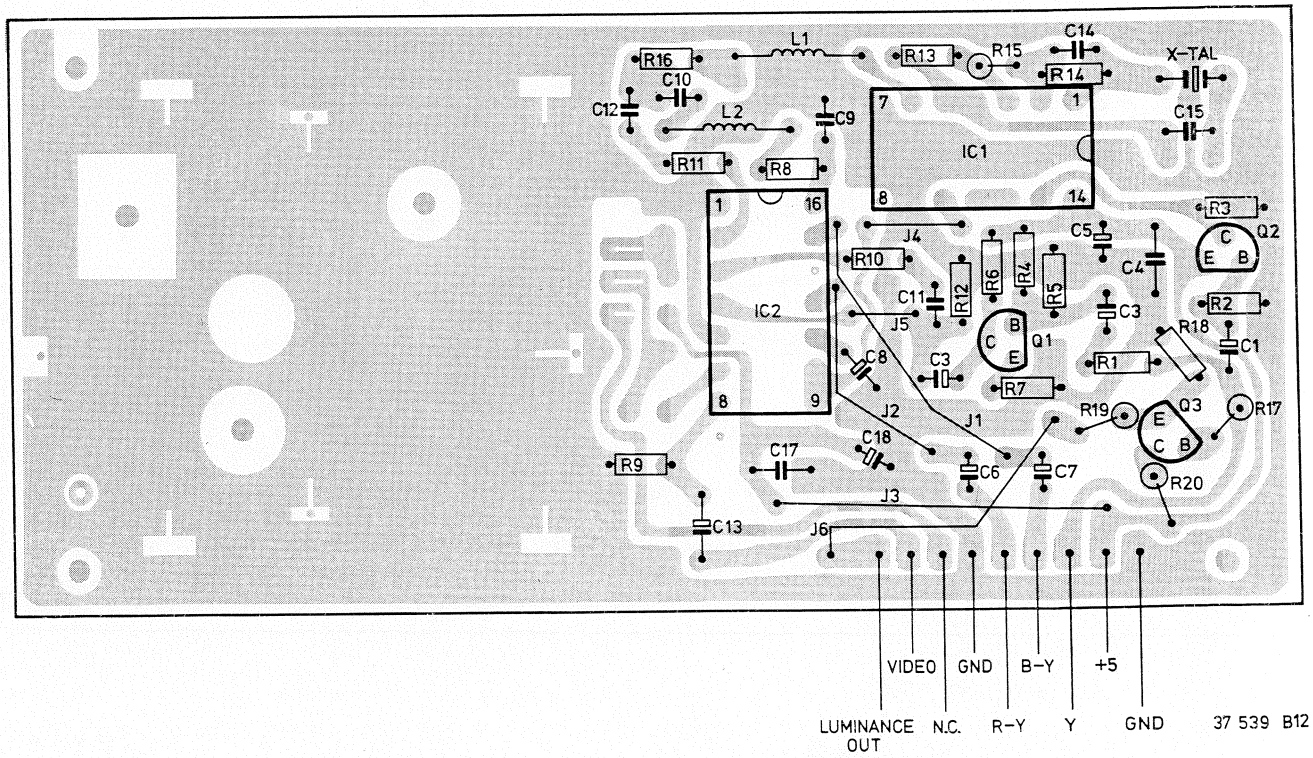
Frequenza d'orologio VDP

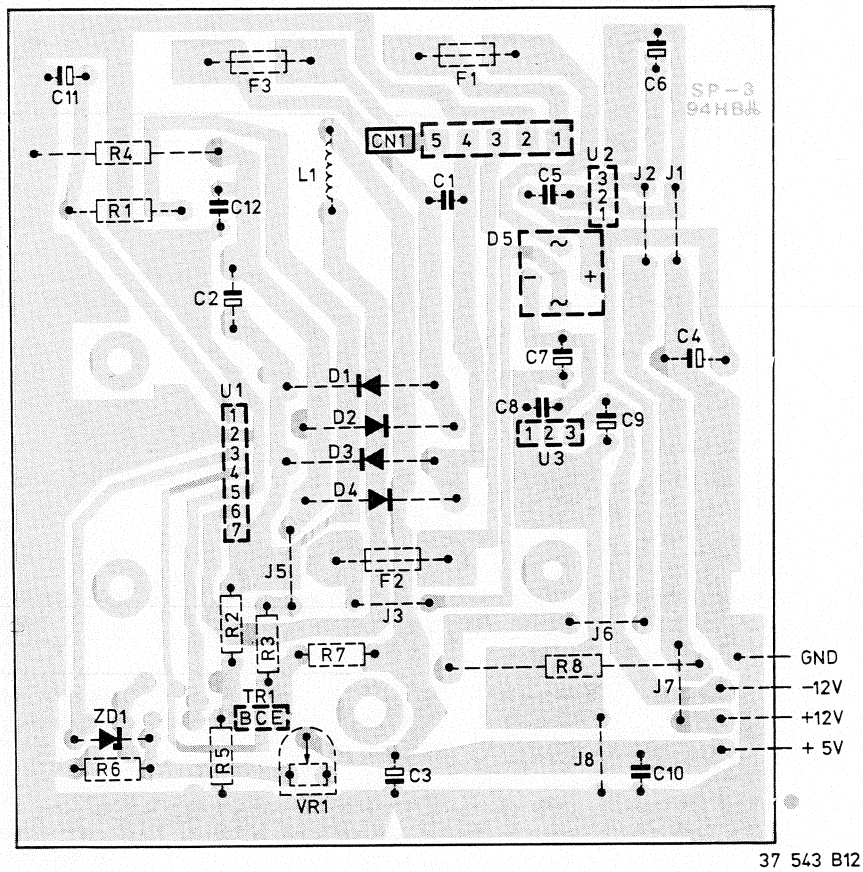
— Tramite una sonda 10:1 collegare un frequenziometro su 37U30.
— Regolare TC1 per una frequenza di 445,32 kHz.

Tensione di alimentazione

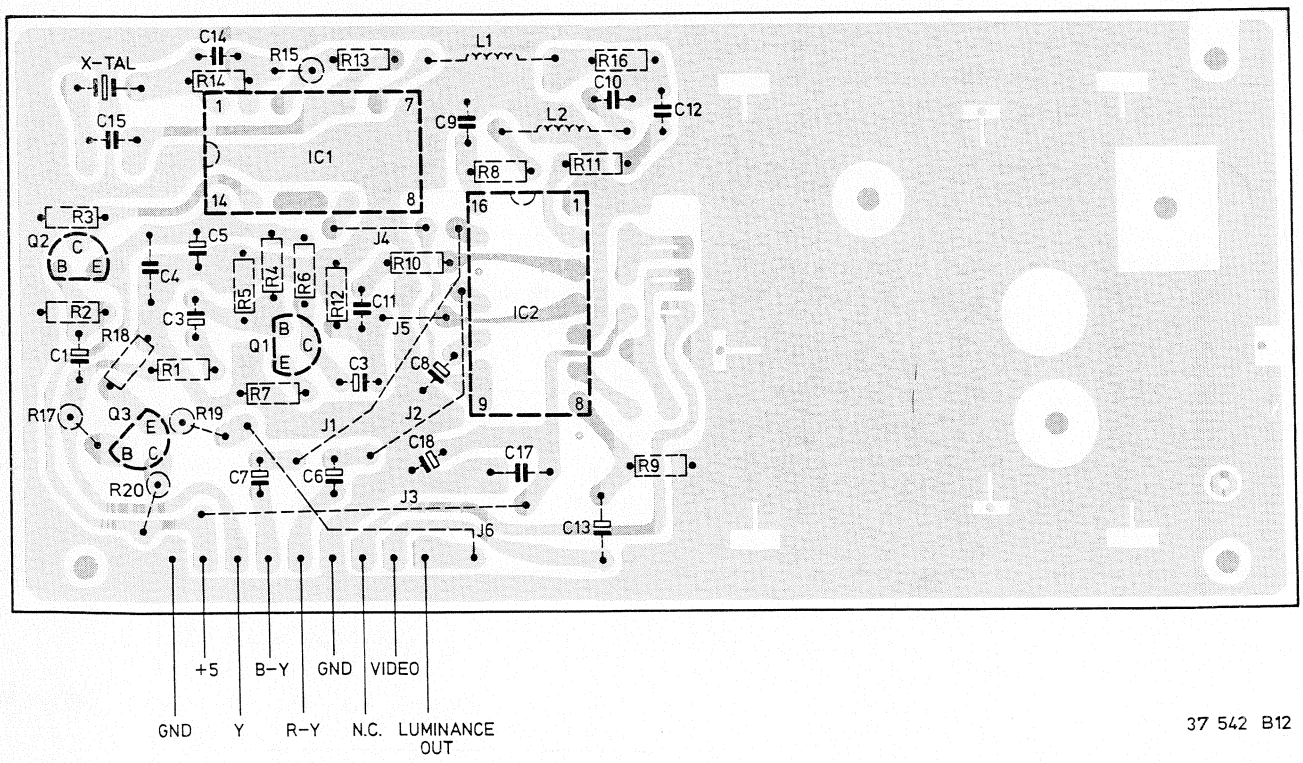
— Sulla piastra di tensione di alimentazione, regolare per una frequenza di 5 V sull'uscita (C3).


C6
F1
F3
C11
1 2 3 4 5
CN1
U2
3
2
1
J1
J2
C5
C1
L1
R4
C12
R1
D5
C2
C4
C7
D1
C8
C9
3 2 1
U3
D2
D3
U1
1
2
3
4
5
6
7
D4
F2
J5
J3
R2
J6
R7
R3
GND
R8
J7
TR1
E C B
ZD1
−12 V
+12 V
+ 5 V
C10
J8
C3
VR1
R5
R6
37 540 B12


L1
R16
R13
R15
C14
X-TAL
C10
R14
C12
L2
C9
IC1
C15
R11
R8
R3
J4
C5
Q2
C
E B
R10
R6
R4
R5
C4
C11
R12
IC2
J5
C3
R2
C
B
E
Q1
R18
C8
C3
R1
C1
R7
R19
Q3
R17
J2
J1
E
C B
C17
C18
C6
C7
R9
R20
J3
C13
J6
VIDEO
GND
B−Y
+5
LUMINANCE OUT
N.C.
R−Y
Y
GND
37 539 B12



37 543 B12



37 542 B12

MAIN PRINTED BOARD

U1	74LS74AP	4822 209 80782
U2	74HC368	4822 209 11044
U3	Z80A	4822 209 10569
U4,U5	74LS367AP	5322 209 85558
U6,U7	74LS157P	5322 209 81521
U8--U15	4864P-3	5322 209 81241
U16	74LS139P	5322 209 14876
U17	74LS153P	5322 209 85488
U18	8255AC-5	4822 209 10902
U19	74LS145P	4822 209 81083
U20	HN613256PS41	4822 209 11043
U21	74LS74AP	4822 209 80782
U22	74LS138P	5322 209 85647
U23	74LS245	5322 209 82215
U24	YM-2149	4822 209 11039
U25	74LS74AP	4822 209 80782
U26,U27	74LS157AP	5322 209 81521
U28	74LS32P	5322 209 85311
U29	74LS273P	5322 209 85792
U30	TMS-9929A	4822 209 11038
U31--U38	4816AP-7	4822 209 11041
U39	7407P	5322 209 84077
U40	74LS367AP	5322 209 85558
U41	74LS368AP	4822 209 81433
U42	74LS08P	5322 209 84995
U43,U44	74LS32P	5322 209 85311
U45	74LS138P	5322 209 85647
U46	74LS02P	5322 209 85312
U47	74LS00P	5322 209 84823
U48	UPC311C	5322 209 85503
U49	74LS74AP	4822 209 80782
U50	NJM4558D	4822 209 80401
U51	74LS367AP	5322 209 85558
U52	4050BP	4822 209 11042
U53	74LS00P	5322 209 84823

Q2	2SA720	4822 209 11045
Q3	2SC2603	4822 130 42545

RA1,RA2	8x10k	4822 116 90189
RA3	8x4k7	4822 116 90191
RA4	8x10k	4822 116 90189

C4	4.7 μ - 25 V	4822 124 10497
C6	0.022 μ - 50 V	4822 121 42417
C22	4.7 μ - 25 V	4822 124 10497
C71	0.022 μ - 50 V	4822 121 42417
C80	1500 p - 50 V	4822 121 42416
C81	1000 p - 50 V	4822 121 42421
TC1	25 p trimmer	4822 125 50271

L1	22 μ	4822 156 10788
X1	10.6875 MHz	4822 242 71136
X2	14.31818 MHz	4822 242 71137
D1--D6	1S2076	4822 130 31304

POWER SUPPLY

U101	Power supply	4822 216 92255

U1	STK-770	4822 209 83127
U2	7812	4822 209 83128
U3	7912A	5322 209 81856

Q1	2SC2603	4822 130 42545
D1--D4	S2V-10	4822 130 32814
ZD1	HZ2CL	4822 130 32818

R4	0.22 Ω - 2 W	4822 113 31015
R8	56 Ω - 3 W	4822 113 31016
VRT	500 Ω potm.	4822 101 90157

C5	0.01 μ - 50 V	4822 121 90038
C8	0.01 μ - 50 V	4822 121 90038

Various

L1	150 μ - 3A	4822 158 10736
T1	Transformer	4822 146 21012

PAL ENCODER

U100	PAL encoder	4822 212 10216

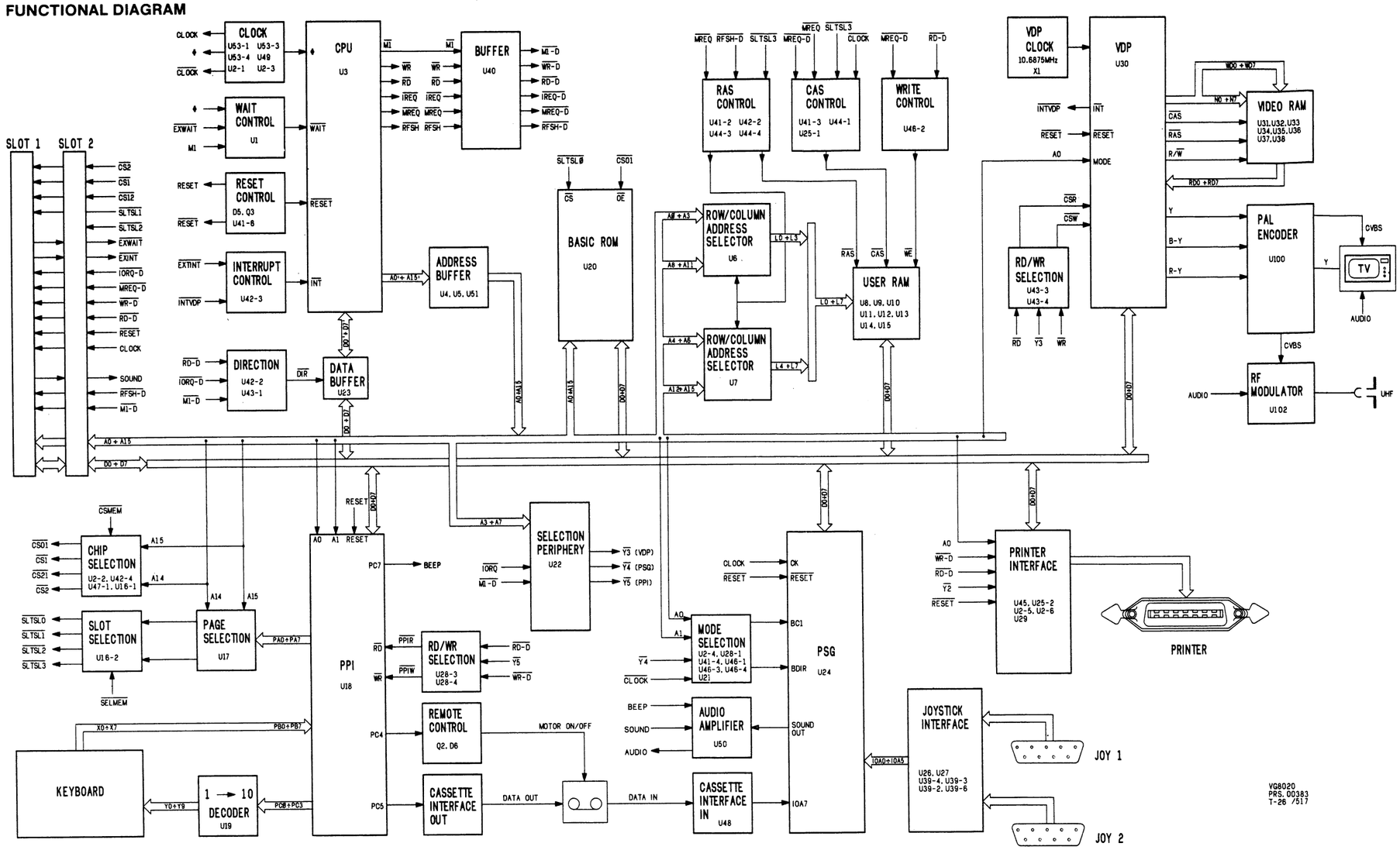
MODULATOR

U102	RF modulator	4822 212 10215

MECHANICAL PARTS LIST

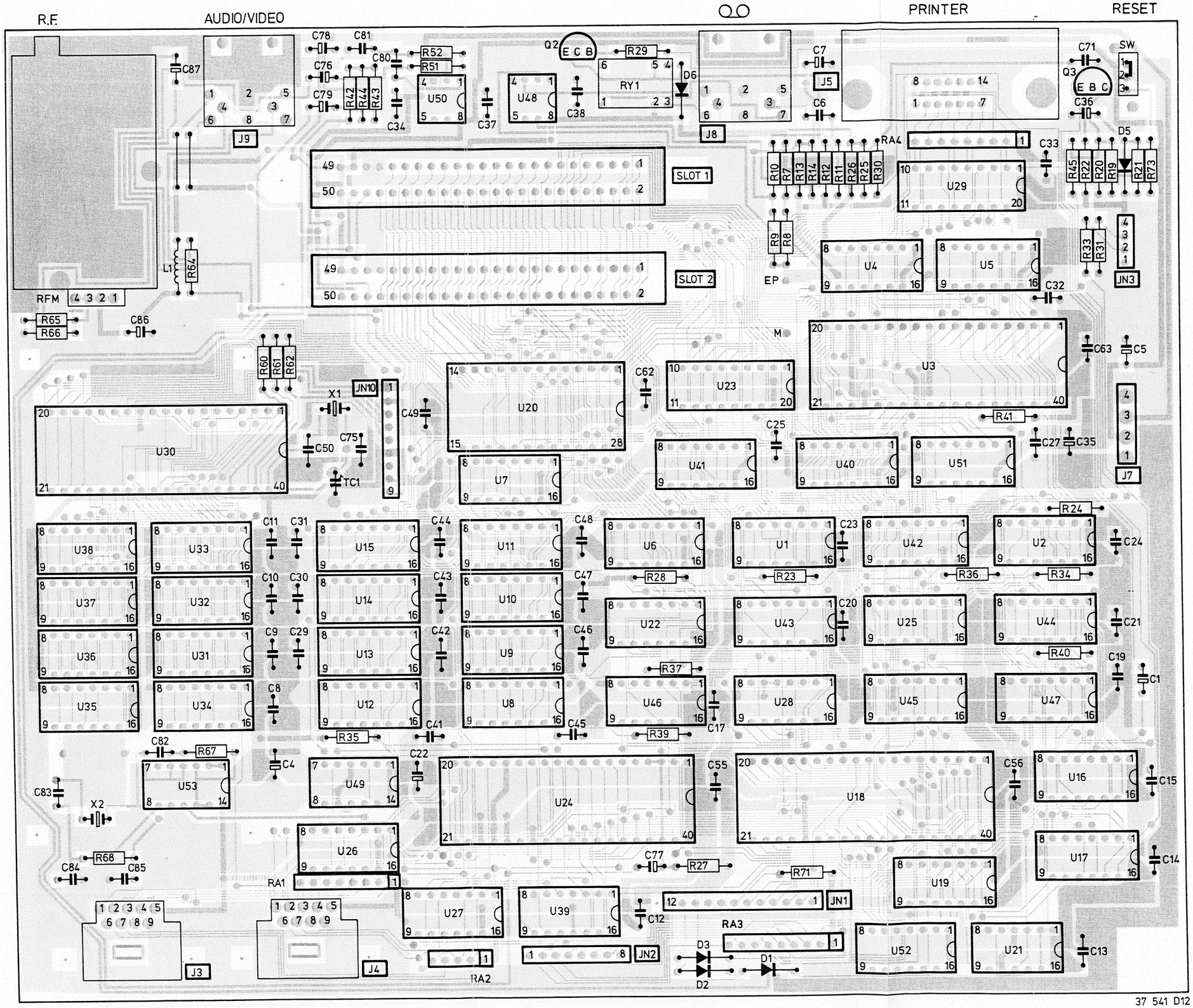
1	4822 432 10532	Top case cabinet
2	4822 219 80639	Keyboard
3	4822 212 10216	PAL encoder
4	4822 404 60186	PAL front bracket
5	4822 267 50553	Joystick connector
6	4822 267 50549	Connector keyboard (8p)
7	4822 267 50551	Connector keyboard (12p)
8	4822 432 10533	Bottom case cabinet
9	4822 267 40589	Connector with cord
10	4822 267 50548	Connector (8p)
11	4822 404 60187	PAL rear bracket
12	4822 212 10215	RF modulator
13	4822 267 70151	Connector 2x25 fold
14	4822 462 30268	ROM pack guide
15	4822 267 50554	Connector printer
16	4822 276 11502	Reset switch
17	4822 432 91738	Slot cover
18	4822 212 10214	LED PCB assembly
19	4822 216 92255	Power supply unit
20	4822 146 21012	Transformer
21	4822 265 20264	Connector (2p)
22	4822 277 10832	Mains switch
23	4822 404 60188	Coil bracket
24	4822 158 10735	Troidal filter

FUNCTIONAL DIAGRAM



SPECIFICATIONS OF IC'S

Position	Type	Description	Function
U1	74LS74	2x D-FF	$\overline{WAIT}$
U2	74HC368	6x inverter	$\overline{CLOCK}$, $\overline{CS12}$, printer, mode P.S.G.
U3	Z80A	μ-processor	C.P.U.
U4,U5	74LS367	6x tri-state buffer	Address buffer
U6,U7	74LS157	2x 4-bit selector	Row/column address selector
U8-U15	4864P-3	RAM	User RAM
U16	74LS139	2x 1→4 decoder	Chip and slot selection
U17	74LS153	2x 4→1 multiplexer	Page selection
U18	8255AC-5	P.P.I.	Programmable peripheral interface
U19	74LS145	1→10 decoder	Keyboard
U20	HN613256PS41	ROM	BIOS
U21	74LS74	2x D-FF	Mode P.S.G.
U22	74LS138	1→8 decoder	Periphery selection
U23	74LS245	8x bidirectional buffer	Data buffer
U24	YM-2149	P.S.G.	Programmable sound generator
U25	74LS74	2x D-FF	$\overline{CAS}$, printer interface
U26	74LS157	2x 4 bit-selector	Position joystick 1-2 selector
U27	74LS157	2x 4 bit-selector	Trigger joystick 1-2 selector
U28	74LS32	4x OR	$\overline{PPIR}$, $\overline{PPIW}$, Mode P.S.G.
U29	74LS273	8x D-FF	Printer interface
U30	TMS9929A	V.D.P.	Video display processor
U31-U38	4816	RAM	Video RAM
U39	7407	6x buffer	TRG-A1, TRG-A2, TRG-B1, TRG-B2
U40	74LS367	6x tri-state buffer	Control lines buffer
U41	74LS368	6x inverter	$\overline{RESET}$, $\overline{SELMEM}$, MUX, $\overline{CAS}$, Selection periphery, Mode P.S.G.
U42	74LS08	4x 2-AND	$\overline{WE}$, $\overline{CSO1}$, $\overline{DIR}$-data buffer, $\overline{INT}$
U43	74LS32	4x 2-OR	$\overline{CSR}$, $\overline{CSW}$, selection periphery, $\overline{DIR}$-data buffer
U45	74LS138	1→8 decoder	Printer interface
U46	74LS02	4x 2-NOR	BC1, BDIR, $\overline{WE}$
U47	74LS00	4x 2-NAND	$\overline{CS12}$, page selection
U48	UPC311C	Voltage comparator	Cassette interface in
U49	74LS74	2x D-FF	Clock
U50	NJM4558D	OPAMP	Audio amplifier
U51	74LS367	6x tri-state buffer	Address buffer
U52	4050	6x buffer	Keyboard
U53	74LS00	4x 2-NAND	Clock



37 541 D12

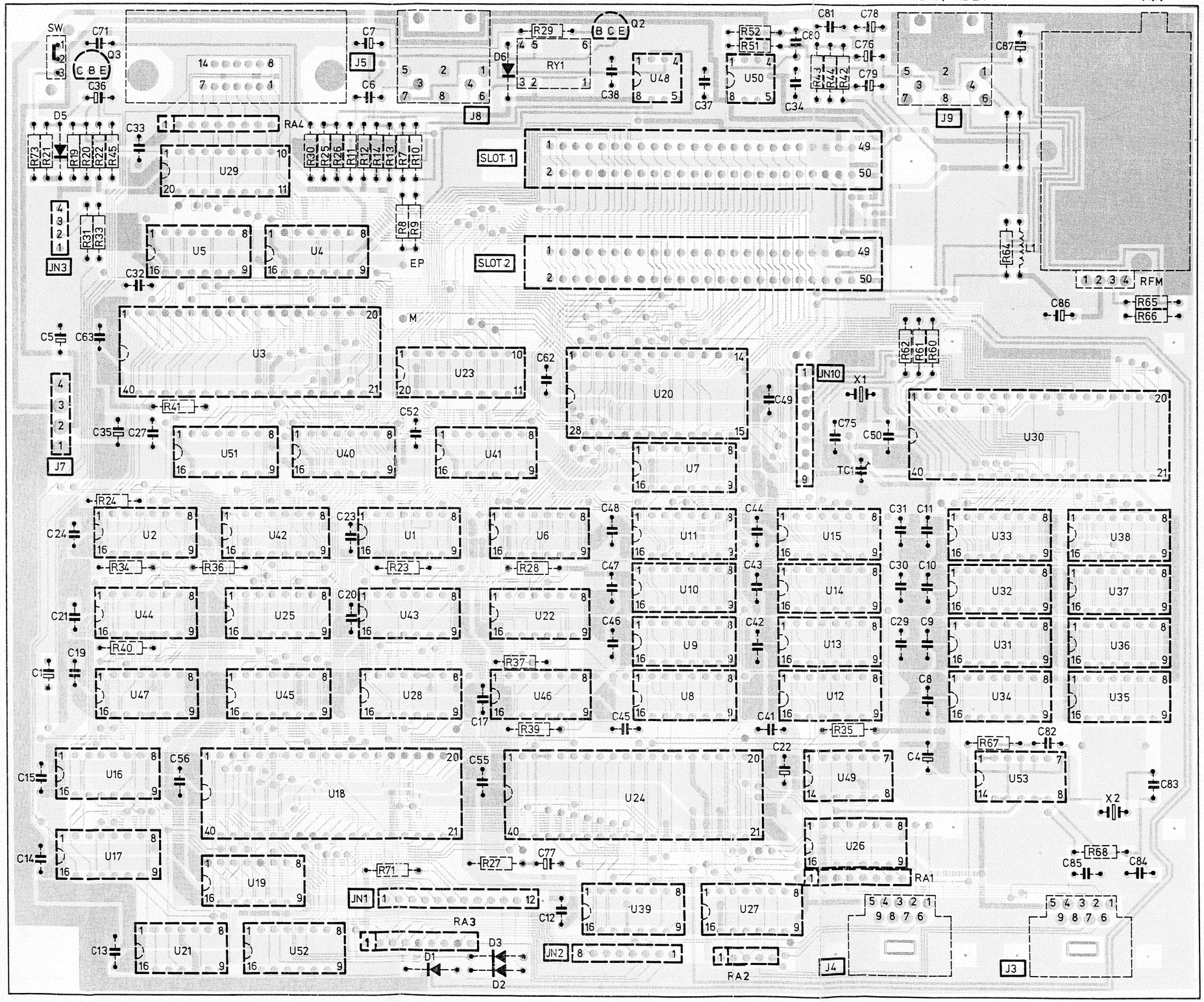
CS 100 726

RESET

PRINTER

AUDIO / VIDEO

R.F.



37 544 D12

| | | |

U46	74LS02	4 2-INPUT NOR	14	7
U47	74LS00	4 2-INPUT NAND	14	7
U49	74LS74	2-FOLD D FLIP/FLOP	14	7
U52	4050B	6-FOLD INVERTER	1	8
U53	74LS00	4 2-INPUT NAND	14	7

C17 - 10n ΔΔf
C19 - 10n ΔΔf

CENTRAL PROCESSING UNIT (CPU)

U20 23256 BASIC ROM

U18 8255A PROGRAMMABLE PERIPHERAL INTERFACE (PPI)

U17 74LS153 SELECT LOGIC

U18 74LS139 2→4 DECODER

U22 74LS138 3→8 DECODER

U19 74LS145 1→10 DECODER

U23 74LS245

U6 74LS157

U7 74LS157

U5 74LS367

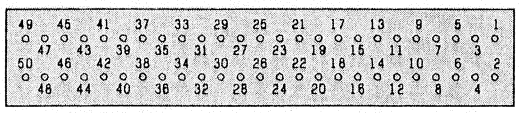
U4 74LS367

U40 74LS367

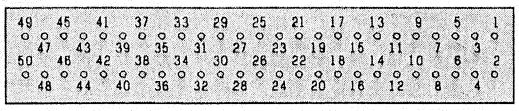
RA3

PIN LAYOUT CARTRIDGE SLOTS

SLOT 1



SLOT 2



JN1

JN2

	X0	X1	X2	X3	X4	X5	X6	X7	
Y0	Ø	1	2	3	4	5	6	7	Y0
Y1	8	9	-	=	\	[	]	;	Y1
Y2	´	`	,	.	/	DEAD KEY	A	B	Y2
Y3	C	D	E	F	G	H	I	J	Y3
Y4	K	L	M	N	O	P	Q	R	Y4
Y5	S	T	U	V	W	X	Y	Z	Y5
Y6	⇧	CTRL	GRPH	CAPS	CODE	F1	F2	F3	Y6
Y7	F4	F5	ESC	TAB	STOP	⇦	SE-LECT	◄┘	Y7
Y8	SPACE	HOME	INS	DEL	←	↑	↓	→	Y8
Y9									Y9
Y10									Y10
Y11									Y11

4 2-INPUT NOR	14	7	C17 - 10n ΔΔf
4 2-INPUT NAND	14	7	C19 - 10n ΔΔf
2-FOLD D FLIP/FLOP	14	7	
6-FOLD INVERTER	1	8	
4 2-INPUT NAND	14	7	

U6 74LS157 · U7 74LS157 · MUX · U41-2 · U44-3 · U44-4 · U42-2 · U46-2 · U41-3 · U25-1 · U44-1 · MREQ · RFSH-D · SLTSL3 · RD-D · MERQ-D · MREQ-D · CLOCK · SLTSL3 · MREQ · R40 · R37 · R39 · RAS · WE · CAS

U43-4 · U43-3 · WR · RD · Y3 · RESET · INTVDP · A0 · CSW · CSR · RESET · INT · MODE · GROX

RD0 RD1 RD2 RD3 RD4 RD5 RD6 RD7 · R60 · R61 · R62 · Y · B-Y · R-Y

U22 74LS138 · DECODER · U41-1 · U43-2 · IORQ · MI-D

U24 YM2149 · PROGRAMMABLE SOUND GENERATOR (PSG) · U41-4 · U21-1 · U21-2 · U46-1 · U28-1 · U46-4 · U46-3 · U2 -4 · RESET · CLOCK · SELECT · BC1 · BDIR · BC2 · A8

U26 74LS157 · U27 74LS157 · RA1 · RA2 · NORTH · SOUTH · WEST · EAST · TRGA · TRGB · U39-4 · U39-3 · U39-2 · U39-6

J4 JOY 2 · J3 JOY 1

U47-4 · U47-3 · U28-4 · U28-3 · U39-1 · RD · WR · PC7 · PC6 · PC5 · PC4 · BEEP · CAPS · JN3-4 · JN3-2 · R33 220 · 1-15-U17

SOUND · BEEP · AUDIO · C78 · C79 · C76 · R43 4k7 · R44 20k · R51 100 · C80 1n5 · R52 5k6 · C34 10n · C37 10n · C81 1n · U50 NJM4558D · R42 2k7 · C77 · R27 470 · +12 · -12

C1 1u · R30 4k7 · R25 4k7 · C71 22n · R26 100 · D8 1S2076 · RY1 · J8 · Q2 2SA720 · R29 1k · C6 22n · R11 10k · R12 470k · R13 2k7 · R10 10k · R14 2k7 · R9 4k7 · R8 220k · C7 10u · C38 10n · R7 1k · U48 μPC311 2

U45 74LS138 · DECODER · U25-2 · U2-5 · U2-6 · U29 74LS273 · P0 P1 P2 P3 P4 P5 P6 P7 · R34 10k · C33 10n · RESET

C56 100n · C62 100n · C55 100n · BASIC ROM · CS · CS01 · 10.6875MHz · TC1 25p · C75 12p · X1 · X2

12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

| | | |

M11 U2 U28 U22 M15 U28 Q13 U30 A23 U36 B29 U39 S23 U41 P15 U42 G18 U44 I20 U46 P18 U48 V18 U52 T 9 U53 A 9 X1 C22
U 9 U2 U28 U24 M21 U28 R13 U31 B26 U37 B29 U39 S23 U41 P 6 U42 M 7 U44 G19 U46 P20 U49 A 5 U52 Y 8 U6 F15 X1 G32
A 4 U2 Q33 U25 H19 U28 P19 U32 B26 U38 B30 U4 H 9 U41 F18 U43 K 6 U44 F19 U46 Q20 U49 A 6 U52 S 9 U7 H15 X2 A 9
C 4 U20 E12 U25 S28 U29 V28 U33 B27 U39 S13 U40 I 9 U41 N17 U43 H22 U44 P 7 U47 N 7 U5 E 9 U52 R 9 U8 B16 ZD1 D33
N 6 U21 P16 U26 M22 U3 B 7 U34 B27 U39 S23 U41 F 7 U42 H 5 U43 H22 U45 M28 U47 P13 U50 T18 U53 A 7 U9 B16
Q15 U21 P17 U27 P22 U3 R33 U35 B28 U39 T23 U41 H18 U42 J 5 U43 N17 U46 G19 U47 Q13 U51 C 9 U53 A 8 VR1 P33

25 26 27 28 29 30 31 32 33 34 35 36 37 38

A B C D E F G H I J K L M N P Q R S T U V W

PAL ENCODER

U-100

JN10

MONITOR

RF MODULATOR

POWER SUPPLY

U101

JOY 1

WD4 N3 12
WD5 N4 11
WD6 N5 10
WD7 N6 13
15
4
3

A3 A4 A5 A6 CAS RAS WE

D0 D0 D0 D0 D0 D0 D0 D0

RD0 RD1 RD2 RD3 RD4 RD5 RD6 RD7 14

Y
R1 3k3
C2 100µ
Q1 2SC1634
C3 100µ
C11 33p
R10 1k
R5 2k2
R7 330-560
R12 8k2
PAL ENCODER
C13 470µ
CVBS
R9 120
+5
Q2 2SA564
C1 0µ47
R2 470
R3 470
IC1-6
IC1-5
C8 33µ
R-Y
C6 0µ47
B-Y
C7 0µ47
C14 22p
R14 560
R13 1k8
IC1-1
IC1-2
IC1-3
R15 220
L1
R16 3k3
C12 33p
C10 150p
L2
C16 150p
R11 2k7
R8 2k2
C9 330p
X1 4.433619MHz
C15 12...27p
+5V
C5 33µ
C4 20n

JN10

60 Y
61 B-Y
62 R-Y

CVBS
J9
AUDIO
CVBS
R64 68
+12
+5
MONITOR
C87 100µ
R65 1k8
R66 1k8
U102
RF MODULATOR
L1
C86 33µ
UHF

RA1 10k

U45 74LS138
P0 P1 P2 P3 P4 P5 P6 P7
DECODER
EN
A0 WR-D RD-D Y2

POWER SUPPLY
U101
U1 STK770
J7
JN3-4
POWER
JN3-3
R31 220
C35 470µ
C10 100n
C3 1000µ
500 VR1
ZD1 HZ2CL
R6 470
C11 10µ
TR1 2SC2603
R1 4k7
R2 1M
R5 12k
C2 4700µ
R7 1k5
R3 100
R4 0,22
C12 100n
D1 D2 D3 D4 D1..D4 S2V.10
C1 100n
F3 1.6A T
CN1
T1
SW1
L100
220V
R8 56
U2 AH7812
+12V
C5 100µ
C6 1µ
C5 10n
C4 3300µ
D5 1B4B1
F1 315mA T
U3 JRC7912
-12V
C9 1µ
C8 10n
C7 220µ
F2 315mA T

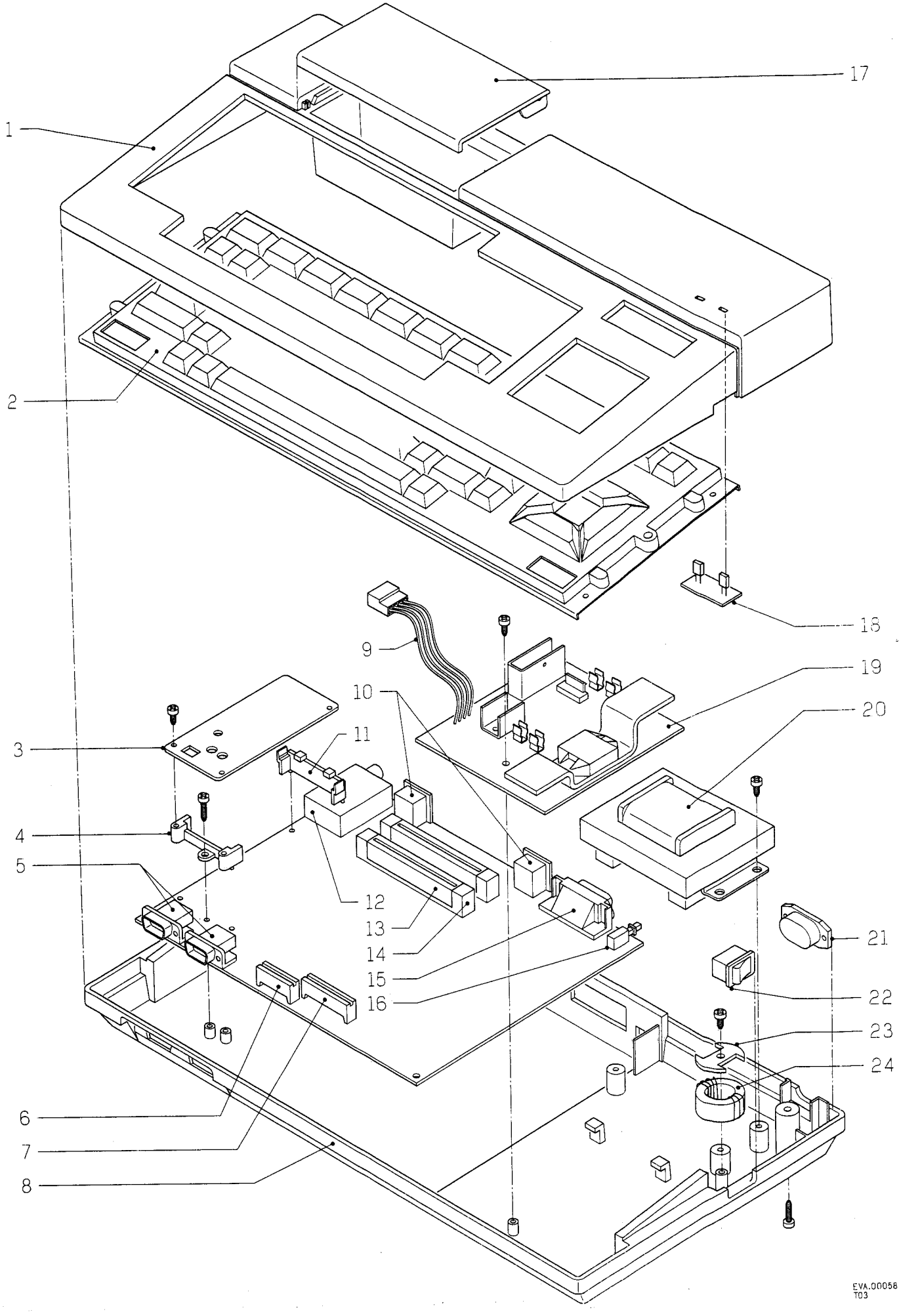
RESET
U25-2
P4
D0
D1
P2
P5
U2-5
U2-6
R38 10k
R34 10k
STROBE
J5
BUSY
RA4 10k
C33 10n
U29 74LS273
DATA1 DATA2 DATA3 DATA4 DATA5 DATA6 DATA7 DATA8

JOY 1

J5
PRINTER

PRS.00298
T=08 VG8020

CS 100 734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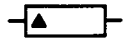
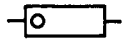
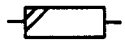
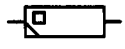
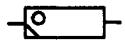
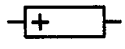
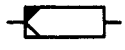
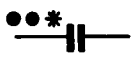
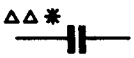
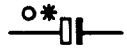
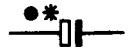
EVA.00058
T03

CS 100 732

SYMBOLS USED IN CIRCUIT DIAGRAMS

SYMBOL	TYPE	$P_{t_{amb}}^{70°}$	TOLERANCE	SERIES	RANGE 2322...
	SFR16	0.2	10Ω – 1M 5%	E24	180
	SFR25	0.33	1Ω – 10M 5%	E24	181
	SFR30	0.5	1Ω – 10M 5%	E24	182
	CR52	0.67	1Ω – 1M 5%	E24	213
	MR25	0.4	1Ω – 1M 1% (2%)	E24	151
	MR30	0.5	1Ω – 1M 1% (2%)	E24	152
	VR37	0.5	220k – 33M 5%	E24	242
	VR68	1	100k – 68M 5%	E24	244

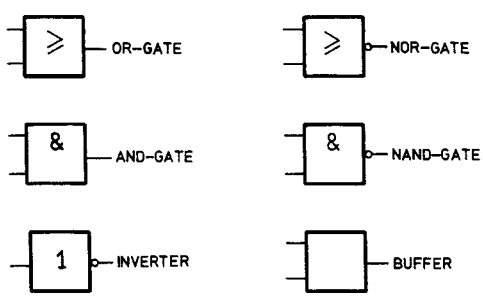
SYMBOL	TYPE	VOLTAGE DC	TOLERANCE	RANGE 2222...
	POLYESTER FLATFOIL	SEE NOTE	10%	342 ÷ 352 365 ÷ 368
	PLATE CERAMIC	SEE NOTE	DEPENDING ON CAPACITY	629 ÷ 683
	ELCO MINIATURE SINGLE	SEE NOTE	−10+50%	015 ÷ 033 041 ÷ 043
	ELCO SINGLE ENDED	SEE NOTE	± 20%	035

NOTE :

*

	f = 25V	q = 200V	x = 1000V	E = 20V
	g = 40V	r = 250V	z = 1600V	F = 35V
a = 2.5V	h = 63V	s = 300V	A = 1.6V	G = 50V
b = 4V	j = 100V	t = 350V	B = 6V	H = 75V
c = 6.3V	l = 125V	u = 400V	C = 12V	I = 80V
d = 10V	m = 150V	v = 500V	D = 15V	
e = 16V	n = 160V	w = 630V		

34 498 A12



36 570 A12